REMARKS

This Amendment is filed in response to the Final Office Action mailed on November 8, 2007, and is herewith filed a Request for Continuing Examination. All objections and rejections are respectfully traversed.

Claims 1, 3-4, and 6-8 are currently pending.

Claims 18-26 have been cancelled. Applicant reserves the right to bring the claims in a divisional or continuation application.

Request for Interview

The Applicant respectfully requests a telephonic interview with the Examiner after the Examiner has had an opportunity to consider this Amendment, but before the issuance of the next Office Action. The Applicant may be reached at 617-951-3067.

Double Patenting Rejection

At paragraph 2 of the Office Action, claims 1, 3, and 4 were provisionally rejected on the ground of non-statutory double patenting over US Application Serial No. 10/413,986. Applicant respectfully notes that 10/413,986 is abandoned, and therefore the double patenting rejection is moot.

Claim Rejections – 35 USC §103

At paragraphs 4-5 of the Office Action, claims 1 and 3 were rejected under 35 U.S.C. §103 as being unpatentable over Tanizaki et al. Japan Patent No. 4-274174, hereinafter Tanizaki, in view of Tan, US Patent No. 5,687,759, hereinafter Tan.

At paragraph 6 of the Office Action, claims 4-5 were rejected under 35 U.S.C. §103 as being unpatentable over Tanizaki, in view of Guay, US Patent Application Publication No. 2005/0058879, hereinafter Guay, and in further view of Tan.

At paragraph 10 of the Office Action, claims 1 and 4 were rejected under 35 U.S.C. §103 as being unpatentable over Hirsch et al, US Patent Application Publication No. 2004/0209133, hereinafter Hirsch, in view of Tan.

The present invention, as set forth in representative claim 1, comprises in part:

> 1. A shutter mechanism for controlling reactants in a direct oxidation fuel cell system, having at least one fuel cell including a membrane electrode assembly, comprising:
>
> a moving component disposed within the fuel cell between a source of a reactant and the membrane electrode assembly, ***said moving component having a plurality of laterally displaced protrusions, wherein said movable component is adjustable in a direction perpendicular to the plane in which the component is disposed, such that when it is adjusted, the component travels generally in a z-axis within a vapor gap, closer to or further away from an anode current collector, to control fuel flow while not consuming substantially additional volume within the fuel cell***; and
>
> the anode current collector formed with a plurality of laterally displaced openings corresponding to the plurality of laterally displaced protrusions, such that when said moving component is placed adjacent to said receiving element, the flow of said reactant is controlled, wherein said movable component configured such that when said movable component is adjusted to a closed position, said protrusions interconnect with the openings in the anode current collector to substantially seal said openings, and said movable component also having apertures therein interspersed with said protrusions in such a manner that when said movable plate is in

an open position, said apertures allow for flow of fuel therethrough to the membrane electrode assembly.

By way of background, Tanizaki discloses a fuel cell comprising a fuel chamber equipped with a fuel supply route for supplying fuel to and discharging fuel from a fuel oxidation electrode (anode), an air chamber, an air reduction electrode (cathode) equipped with collector plates, and an electrolyte chamber. Adjacent to the collector plates is a laterally slidable shutter plate with a plurality of apertures formed therein. The apertures correspond directly with apertures in the collector plate so that when the shutter plate is slid laterally in one direction or the other, the shutter plate blocks fuel from entering the electrolyte chamber (i.e., the corresponding apertures no longer align) thereby controlling the fuel flow in the reaction system.

Tan discloses an industrial servovalve system having an inlet, an outlet, a primary valve supported on a casing and a single valve plug that is movable between a closed position (e.g., blocking flow through the casing) and an open position which allows for variable flow through the casing. Tan is directed to control of a flow through a single valve by a pressure control chamber/mechanism. The fluid flow through the system is controlled by the valve plug attached to a primary valve, which is in turn controlled by a pilot valve. The pilot valve forces the primary valve into the aperture when the current supply to the solenoid in the pilot valve is interrupted.

Guay discloses an arrangement for a direct methanol fuel cell which includes a fuel cartridge that supplies a source of fuel to the direct methanol fuel cell. The fuel car-

tridge has a surface area enhanced planar vaporization membrane located within its embodiment. In addition, the arrangement may also include a fuel reservoir to receive fuel from the fuel cartridge that also has a planar vaporization membrane. These planar vaporization membranes are used during pervaporation to vaporize fuel as it moves through the membranes, rather than being vaporized in advanced of the membranes (e.g., allowing the storage of liquid in the cartridge).

Hirsch also discloses a fuel cell with a laterally moving shutter that is adjacent to the collector plate within a fuel cell. Hirsch's disclosed adjustable fuel delivery regulation assembly is a shutter which includes two corresponding perforated components (i.e., plates). The two plates can be positioned relative to one another such that apertures in each component are aligned in certain ways in order to control fuel flow through the cell. For example, blocking the flow of fuel is provided by the perforated shutter plate so that the apertures in the shutter plate and the apertures in the non-movable corresponding plate no longer align.

Applicant respectfully urges that Tanizaki, Tan, Hirsch, and Guay, taken alone or in any combination, do not teach or suggest Applicant's claimed novel ***said moving component having a plurality of laterally displaced protrusions, wherein said movable component is adjustable in a direction perpendicular to the plane in which the component is disposed, such that when it is adjusted, the component travels generally in a z-axis within a vapor gap, closer to or further away from an anode current collector, to control fuel flow while not consuming substantially additional volume within the fuel cell***. In further detail, Applicant's claimed invention includes a moving component

within a fuel cell, where the moving component moves perpendicular to the plane of the moving component to control the flow of fuel in the fuel cell. The moving component has a plurality of laterally displaced protrusions and the anode current collector has a plurality of laterally displaced openings. When the moving component moves perpendicular to the plane of the moving component, i.e., along the z-axis, the plurality of laterally displaced protrusions interconnect with the laterally displaced openings on the anode current collector to prevent the flow of fuel to a membrane electrode assembly (MEA).

In contrast, neither Tanizaki, Tan, Hirsch, nor Guay address laterally displaced protrusions on a perpendicularly movable reactant control plate. Both Tanizaki and Hirsch disclose shutters with a laterally moving/sliding shutter plate which requires an additional amount of lateral space and volume to be reserved in the fuel cell's dimensions. Tanizaki and Hirsch do not disclose or suggest perpendicularly moving a shutter plate, particularly a plate with a ***plurality of laterally displaced protrusions*** to meet with corresponding openings on the anode current collector. Tan does not add to either Taniziki or Hirsh because it teaches of a single main plunger that moves along the y-axis to block the flow of the casing. Tan discloses a single (large) servovalve assembly having only a singular plunger (protrusion) controlling the flow of the casing where the plunger moves (in Fig.1 & 2 moving along the y-axis) perpendicular to the plane of the diaphragm. The plunger does not move perpendicular to the plane of the plunger because the plane of the plunger is along the y-axis. Applicant's invention is moving the moving component perpendicular to the plane of the moving component or in other terms in the z-direction. Guay merely discloses a membrane for vaporizing fuel.

In addition, Applicant respectfully urges that Tanizaki and Hirsch teach away from Applicant's claimed novel invention by teaching laterally moving/sliding shutter plates. In particular, laterally moving plates generally would not have protrusions, which would otherwise hinder the sliding action of the plates due to their corresponding relationship with openings on a receiving plate. Without a complex (and non-disclosed) track/groove system, laterally moving adjacent plates with protrusions and corresponding openings would not function properly. Thus, both Tanizaki and Hirsch teach away from moving a ***plurality of laterally displaced protrusions*** to match with ***corresponding openings***.

Furthermore, Applicant respectfully asserts that the combination of Tanizaki, Tan, Hirsch, and Guay is improper because Tan is non-analogous art to Applicant's claimed invention. The test for analogous art is "in order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." In re Oetiker, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). Tan discloses a servo valve for opening and closing a passage between an inlet passage and an outlet passage. Applicant's invention is directed to fuel cell, which is a separate filed of art because Applicant's endeavor is to create energy in small fuel cells. Applicant's goal is to control the flow of fuel to the anode in small fuel cells, and Tan is to control the flow through the casing. However, the electromechanical solenoids that control the plungers in the servo valve require more space then is possible in Applicant's small fuel cells used for handheld devices. Accordingly, the servo valve in

Tan is not in the same art or field of endeavor as Applicant's invention because of the size of the servo valves.

Applicant respectfully urges that the Tanizaki, Tan, Hirsch, and Guay patent documents, taken alone or in any combination, are legally insufficient to make obvious the presently claimed invention under 35 U.S.C. § 103 because of the absence of the Applicant's claimed novel ***said moving component having a plurality of laterally displaced protrusions, wherein said movable component is adjustable in a direction perpendicular to the plane in which the component is disposed, such that when it is adjusted, the component travels generally in a z-axis within a vapor gap, closer to or further away from an anode current collector, to control fuel flow while not consuming substantially additional volume within the fuel cell.***

At paragraph 7 of the Office Action, claim 6 is rejected under 35 U.S.C. §103 as being unpatentable over Tanizaki, in view of Guay, and Tan, and in further view of Cleveland et al., US Patent No. 4,047,695, hereinafter Cleveland.

At paragraph 8 of the Office Action, claim 7 is rejected under 35 U.S.C. §103 as being unpatentable over Tanizaki, in view of Guay, and Tan, and in further view of Fukano et al., US Patent Application Publication No. 2003/0102032, hereinafter Fukano.

At paragraph 9 of the Office Action, claim 8 is rejected under 35 U.S.C. §103 as being unpatentable over Tanizaki, in view of Guay, and Tan, and in further view of Griffin, US Patent Application Publication No. 2003/0213519, hereinafter Griffin.

Applicant respectfully notes that claims 6-8 are dependent claims that depend from independent claims believed to be in condition for allowance. Accordingly, claims 6-8 are believed to be in condition for allowance.

All independent claims are believed to be in condition for allowance.

All dependent claims are believed to be dependent from allowable independent claims, and therefore in condition for allowance.

Favorable action is respectfully solicited.

Please charge any additional fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,

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